The Maine Installer

Dedicated to Professionalism in Underground Tank Installation

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The ABCs of ATG's

Leak Prevention Tank-nically Speaking by Marcel Moreau

Fifteen years ago, if you wanted to know how much liquid was left in your underground gasoline tank, there was only one way to do it: Insert a long wooden stick into the tank and see at what level the stick was wet. In today's world of large tanks, very high throughput facilities, and careful management of fuel inventories, the wooden stick is rapidly becoming obsolete. Liquid fuel measurement has entered the electronic age, and the wooden stick is being replaced by the automatic tank gauge or "ATG."

Automatic tank gauges can dramatically improve fuel inventory recordkeeping and underground tank leak detection accuracy. Unfortunately, however, while the technology has entered the electronic age, a great many owner/operators haven't -- many still regard their tank gauges as convenient, but over-priced, wooden sticks. They do not fully utilize the fuel management capabilities of these devices, nor do they understand the regulatory requirements associated with their use as tank leak detection devices.

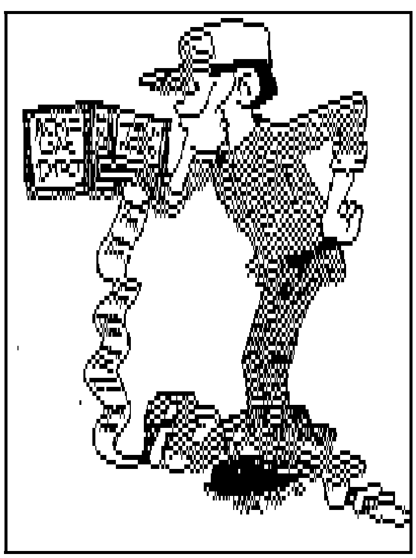
When ATG Means "Another Tank's a Goner"

Here's a true story that illustrates how some people don't understand the ABCS, let alone the XYZS, of ATGs. A tank owner installed an ATG at a facility where the tanks were a few years old. Everything was fine for the first few months, but then one morning the ATG printout showed that the super unleaded tank had failed a leak test. The owner called the service person.

The service person got a reading of the product level from the tank gauge, confirmed the reading with a gauge stick, declared that everything was working fine, and went on to his next call. But the next morning the printout, again, indicated a failed test. The service person returned and removed the probe from the offending tank. The problem went away ... but not for long. A week later the service person was called back because the super unleaded pump wasn't working.

The service person determined that the pump was fine, but that the tank was empty. The owner said this was impossible; he had not sold that much super unleaded. The service person suggested that perhaps the previous delivery of super unleaded product had been made to the wrong tank.

The owner ordered another 3,000



gallons of super unleaded. Within a few weeks, the super unleaded pump stopped working again, and like

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The New, and Hopefully Improved, Chapter 691

At this writing, we're winding down on the open comment period for proposed changes to DEP's underground tank rules, the now famous Chapter 691. That comment period ends September 27, and the Department expects to have the rules adopted by the Board of Environmental Protection (BEP) soon thereafter. For those that did not get a chance to take advantage of their opportunity to read the proposed amendments and comments, here's a summary of changes. There are a number of editorial changes, modification of site assessment procedures, and operation/maintenance procedure changes for tank owner operators which are not discussed here. Instead, this article attempts to outline only those changes of major significance to installers and removers.

- The definition of what is and what is not a "sensitive geologic area" will be made consistent with legislation enacted following the last amendment of Chapter 691 (1991). If a facility is a public water supply only because the well is used to make coffee and tea for sale to customers, the facility is not considered to be on a sensitive geologic area.
- A number of references incorporated into the regulations have been updated since the last amendments. These amendments will incorporate the newest versions, including: NACE RP-02-85, "Control of External Corrosion on Metallic Buried, or Partially Buried, or Submerged Liquid Storage Systems," has been

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before, the tank was determined to be empty. This time the service person suggested that someone was stealing the product. The owner ordered another 3,000 gallons of super unleaded and waited, under cover, for a week at his facility to catch the thief. The thief never appeared, but within a few weeks, the super unleaded tank was, once again, prematurely empty.

At this point, the owner began to suspect that the tank might have a problem. The service person (who had also installed the tank) insisted that the tank could not be leaking. The owner ordered another 3,000 gallons of super unleaded, locked the fill pipe and dispenser, and monitored the product level with a gauge stick (because the ATG probe had not yet been replaced). No doubt about it, he was losing product. When the tank finally excavated, the affliction was apparent: the steel tank had split a seam. And, to top it off, the town's water supply well was a half mile from the tank.

The irony of this story is that had anyone bothered to look, the ATG would have revealed at the press of a few buttons that there had been no delivery to the wrong tank and no one was stealing product in the middle of the night. Instead, millions of dollars were spent cleaning up 10,000 gallons of product when a little knowledge about ATGs (and quick response to the problem) could have cut the loss to a few hundred gallons.

So let's zoom in on these ATGs and answer such basic questions as: How do they work? What kinds of information do they provide? And what recordkeeping procedures are required when they are used to meet leak detection requirements?

How Do ATGs Work?

An ATG system consists of a probe that is permanently installed inside each buried storage tank and a box, or "console," that is mounted on a wall inside the facility. The console, which is connected to the probes by wires, processes and communicates the information produced by the probes. There are three common types of ATG probes: Magnetostrictive, ultrasonic, and mass measurement. All three types of probes are well suited to the job and can provide the required level of measurement accuracy.

Magnetostrictive Probes consist of long rods that extend down to the bottom of the tank. The rods have two donut-shaped floats that can move up and down the length of the rod. One float is designed to float on top of the product level in the tank; the other floats on top of any water that may be present in the bottom of the tank. Both floats contain magnets.

To understand how a magnetostrictive probe works, you must think back to high school physics and remember that whenever an electric current flows through a wire, a magnetic field is produced around the wire.

The probe determines the liquid level by sending a pulse of electric current down a wire inside the rod. The pulse of current induces a magnetic field around the wire which interacts with the magnetic field produced by the magnets in the floats. This interaction of the two magnetic fields produces a slight twisting movement in the wire that travels along the wire to the top of the probe.

A small sensing coil at the top of the probe detects the arrival of this twist. The time elapsed between the initiation of the electric pulse and the arrival of the wire's twisting movement at the top of the probe is precisely measured and is used to determine the distance between the floats and the top of the probe. This distance is converted to depth of liquid and the depth is converted to volume of liquid, based on information that has been programmed into the ATG concerning the dimensions of the tank.

Magnetostrictive probes typically measure temperature at five discrete points on the probe, using temperature sensing devices called thermistors that are built into the central rod of the probe.

Ultrasonic Probes work by sending a high frequency sound wave from a transducer, located in the bottom of the tank, upward through the liquid in the tank. The sound wave reflects from the surface of the liquid and travels back to the transducer which acts as a microphone and "hears" the signal. Like the magnetostrictive probe, it is the travel time of the signal that is measured and used to calculate the liquid depth, which is then converted to liquid volume, based on the tank dimension information that has been programmed into the ATG.

Because the speed of sound in a liquid varies with temperature, there are calibration rods built into the probe that are a known distance from the transducer. Using measurements of the time it takes for signals to reflect from these rods, the device calculates the temperature of the product and corrects the product level measurement for temperature effects.

Water in the bottom of the tank can be measured by setting the transducer above the tank bottom and sending a signal downward that will reflect off the water/product interface if one is present. Another water measuring technique involves using a small float that sits at the bottom of the probe. A small wire extends upward from this float and is bent at a right angle above the transducer so that this wire will reflect a small portion of the sound pulse back to the transducer, providing an measurement of water depth.

The software that processes the transducer signals must be able to distinguish the reflections coming from the water interface (water sensor), the calibration rods, and the liquid level.

The Mass Measurement technique utilizes a sealed, hollow glass cylinder that is several inches in diameter and slightly less than the diameter of the tank in length. The glass cylinder is suspended inside the tank from a very sensitive scale that monitors its weight. According to

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Archimedes' principle, the weight of the cylinder will be reduced by an amount that is exactly equal to the weight of the liquid displaced by the cylinder.

In other words, the weight of the glass cylinder is proportional to the percentage of the probe that is submerged below the liquid level in the tank. For example, when the tank is nearly full of product and the glass cylinder is almost fully submerged, the weight of the cylinder measured by the scale will be approximately half the weight measured when the tank is half full and the cylinder is only half submerged. With proper calibration, the weight of the cylinder is converted by the ATG software into a liquid level.

The mass measurement technique compensates for temperature effects quite elegantly. The weight of the . glass cylinder depends on the weight of the liquid that the cylinder displaces, and the weight of the liquid (its density) varies with temperature.

Fortunately, the liquid density and the liquid volume are inversely related; as the liquid becomes less dense, the liquid volume increases and vice versa. As a result, a rise in temperature of the liquid produces an increase in the volume of the liquid (and a rise in liquid level) and a corresponding decrease in the density of the liquid, so that the net weight of the liquid displaced by the glass cylinder remains constant. Consequently, the weight of the glass cylinder also remains constant despite changes in temperature.

To make the liquid level measurement independent of temperature changes is a little more difficult in an underground tank, because the surface area of the liquid varies with the liquid level in the tank. For this reason, changes in liquid level will not be exactly compensated by the changes in liquid density unless the glass cylinder is shaped so that it is proportional to the shape of the tank. To accomplish this, the glass cylinder has a slightly larger diameter in the middle and tapers toward both ends. This shape reflects that of the tank which has a larger horizontal diameter in its mid-section than near its top and bottom. Because of the precisely calculated taper in the glass cylinder, changes in liquid level caused solely by temperature do not affect the weight of the probe.

Water in the bottom of the tank is detected by a separate sensor that uses conductivity to measure water depth. Because knowledge of the product temperature is not required for this measurement technique to work, ATGs equipped with this type of probe usually report only the gross volume (see below) of liquid in the tank.

What Information Do ATGs Provide?

Although there are some differences in the probe technology and internal software of the many brands of ATGs available, virtually all of them provide identical output information. Typical ATG output includes:

Facility Identification The facility name and address are printed on paper tape output to identify the facility.

Date The current date is printed on paper tape output.

Time An internal clock is required to conduct leak tests. ATGs also can be programmed to print reports or conduct tests at specified times.

Product Liquid Level The depth of product in inches (usually to the nearest hundredth of an inch).

Gross Product Volume The volume of product calculated from the measured depth of liquid and tank dimension information entered into the ATG by the installer. Note that while the liquid level can be measured very accurately, the accurate calculation of product volume is completely dependent on the data provided by the person installing the ATG

Net Product Volume This is the temperature-compensated volume of product or the volume the product would have if it were at 60° Fahrenheit.

Water Depth The depth of water in the tank in inches (usually to the nearest tenth or hundredth of an inch).

Water Volume The volume of water present calculated from the measured depth of water and the tank dimension information entered into the ATG by the installer.

Ullage Volume The capacity of the tank minus the gross volume of product. This is the volume of the empty space in the tank.

90 Percent Ullage The usable space left in the tank. Most tanks have overfill prevention devices that do not allow the tank to be filled above a certain point (often 90% of tank capacity). The 90-percent ullage is the number that should be considered when ordering product for a tank.

High-Level Alarm Programmed by the installer to warn when the product level exceeds a set level. It can serve as overfill prevention when the ATG is connected to an external alarm that will notify the delivery person that the tank is nearly full.

Low-Level Alarm Programmed by the installer to warn when the product level is below a set point.

High-Water Alarm Programmed by the installer to warn that it is time to remove water from the tank.

Theft Alarm Programmed by the installer to warn that a withdrawal is occurring from the tank at a time when the facility is not operating.

Delivery Volume An automatic calculation of delivery volume based on "before" and "after" delivery readings of tank volume.

Test Result A report of the results of the last evaluation of the tank integrity.

In addition to the standard features listed above, most ATGs also can be equipped (at additional cost) with the following features:

Sensors A wide variety of liquid and vapor sensors can be connected to ATGs to monitor piping sumps, interstitial spaces of tanks, or monitoring wells.

Line Leak Detectors ATGs by themselves only provide leak detection for the tank. Additional hardware can be added to the submersible pumps that will meet all required leak detection requirements for pressurized piping.

Communications ATG consoles can be equipped with modems for remote communication capabilities,

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ports to permit communication with point of sale (POS) systems to integrate sales and inventory data, and automatic dialers to alert off-site personnel of conditions at a facility.

What Do The Rules Require?

In addition to all the capabilities listed above, ATGs also can be used to meet federal leak detection regulations. In Maine, Chapter 691 permits ATG's to be retrofitted and used for leak detection on existing tanks, e.g., those fully installed as of April 19, 1990 and, except for leak detection, otherwise in compliance with Maine regulations. By installing ATG's capable of detecting leaks of 0.1 gallons per hour (gph), facility owner/operators could exempt themselves from daily inventory and statistical inventory analysis requirements, provided the leak detection system(s) include provisions for monitoring piping as well as tanks.

According to proposed Maine regulations, ATG's already installed must detect leaks of 0.2 gph with a probability of detection of at least 95 percent and a probability of false alarm of no more than 5 percent.

A volume of 0.2 gallons is about 3 cups. A probability of detection of 95 percent for leaks of 0.2 gph means that if you were to conduct a leak test on 100 tanks, each of which is leaking at a rate of exactly 0.2 gph, you would correctly identify 95 of these tanks as leakers, and incorrectly call the other five tanks tight. A probability of false alarm of 5 percent means that if you were to conduct a leak test on 100 tanks, each of which is absolutely tight, you would incorrectly identify five of these tanks as leakers.

Monthly Verification of Tank Integrity When ATGs are used for leak detection, regulations require that the integrity of the storage tank be verified at least monthly. There are three approaches used by ATGs to verify tank integrity:

Periodic Test This is the approach first developed by ATG manufacturers to detect leaks. To conduct the test, the tank must not be in service and the product temperature must be fairly stable. The liquid level and temperature are monitored over a period of time (4-8 hours). A significant change in the liquid volume during the test period that is not caused by temperature results in a failed test.

Continuous Test Many facilities are open on a 24-hour basis and owners do not wish to shut down once a month to allow the ATG to conduct a periodic leak test. In response, ATG manufacturers have developed ATGs that continuously test the tank. These devices work by closely monitoring the liquid volume whenever the storage tank is idle for more than a few minutes. By piecing together liquid level data from intervals when the system is idle, the ATG eventually gathers enough information to determine whether the tank is tight.

Although piecing together data from a number of quiet intervals to establish that a storage system is tight is conceptually simple, the task is, in fact, difficult to execute. Factors such as evaporation and condensation of product, tank deformation, variation in leak rate with liquid level, not to mention temperature stability and frequent deliveries of product challenge the ATGs ability to gather reliable data and accurately interpret the results.

As with all quantitative leak detection devices, manufacturers are required to document the performance of continuous test ATGS. Because there were no existing evaluation protocols that were directly applicable to this type of device, manufacturers developed their own test protocols.

As might be expected, such self-evaluations proved to be a bit lenient. The state of California called the manufacturers to task and refused to accept the manufacturer's evaluations as adequate documentation of the equipment performance. In the fall of '95, after more than a year of discussions, California personnel and manufacturer's representatives agreed on the parameters for an acceptable evaluation. As of June of '96, California was still reviewing the results of the new evaluations.

One manufacturer calls this technique of continuous testing "Continuous Statistical Leak Detection (CSLD)" because statistical analysis of the data is required to determine a tank's leak status. This technique

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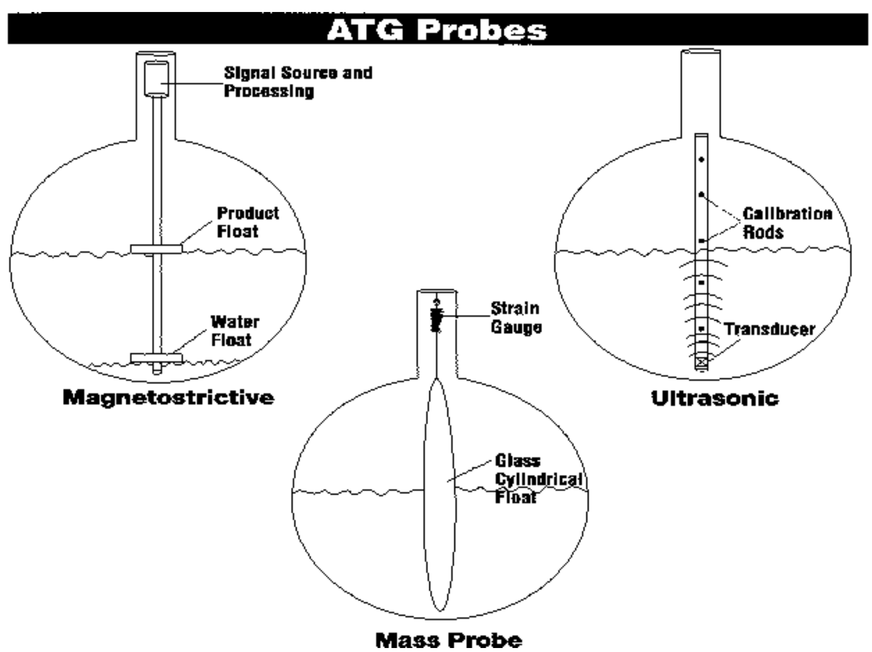

ATG's (continued)

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should not be confused with statistical inventory reconciliation (SIR). CSLD conducts a test solely by monitoring the liquid level of the tank during inactive periods. SIR evaluates a tank by comparing numerous estimates of the amount of product pumped, the volume of product delivered, and the volume of product remaining in the tank (see below).

Inventory Another approach used by some ATG owners to meet leak detection requirements is to use the inventory information provided by the ATG as the raw data for a statistical inventory reconciliation (SIR) system. SIR performs sophisticated statistical analyses on basic inventory data (amount pumped, amount delivered, tank liquid volumes) to establish whether the storage system is tight. Although SIR can work with inventory readings taken with a wooden stick, the increased accuracy and consistency of ATG data can improve the accuracy and reliability of the SIR results.

The use of SIR does not require that a storage system be out of service, so 24-hour facilities equipped with ATGs that perform periodic tests do not need to shut down to meet the regulations. In addition, SIR analyses should detect product lost through piping leaks, so monthly piping leak detection requirements can also be met using this technique.

Recordkeeping

No matter what technique is used to verify the integrity of a storage system, records of at least the last three (3) years of leak detection results must be kept on hand. For ATGs that are conducting periodic or continuous testing, the paper printouts indicating the test results are convenient leak detection documentation. Note that I am talking here of a test report that documents the result of a tank test, not the standard printout that lists the liquid level, temperature, and volume of product in the tank. Only one test report every 30 days needs to be retained to document that tests are conducted at the proper frequency. A great many ATG owners are found to be in violation of leak detection requirements because they fail to keep a record of test results.

Reporting

Any single failed ATG test result that cannot be readily explained must be reported to the Maine Department of Environmental Protection (DEP). An explanation for a failed test might be that the test was started too soon after a delivery (and so temperature had not stabilized) or that fuel was pumped inadvertently during the test interval, or that the ATG was improperly programmed.

If an ATG conducts periodic tests on a daily basis or is a continuous model and prints daily test reports, you need only keep one test result per month for recordkeeping purposes, but you must report to the regulatory agency any failed test that cannot be readily explained.

Certification of Equipment Performance

All ATGs installed after December 22, 1990 must be accompanied by a certificate from the manufacturer stating that the ATG meets the 0.2 gph leak detection performance requirements set in the federal regulations. The regulations state that the manufacturer must certify the performance of the equipment, but the owner of the equipment must retain proof of this certification.

This certificate is also useful to the owner because it states valuable information about the device such as the liquid level required for a valid test, the required minimum duration of the test period, and the time required after a delivery before a test can be conducted. These are handy facts to know if you have a failed test result and are looking for an explanation.

How can you tell if you have this certificate? Look for a piece of paper that reads at the very top "Results of US EPA Standard Evaluation," and contains headings that state "Evaluation Results," "Test Conditions During Evaluation," and "Limitations on the Results." If you do not have it, call your ATG supplier.

Proper Calibration, Maintenance, and Repair

There are reports that as many as 75 percent of ATGs are improperly programmed when they are installed and, therefore, fail to produce the quality data of which they are capable (and that you paid for). Some ATG manufacturers now certify technicians to work on their equipment. When the ATG is serviced, the facility owner/operator is required to keep records of the type of service performed for at least three (3) years.

ATGs and Inventory Control

A literal reading of the federal regulations (40 CFR 280.43(c)) indicates that facilities using ATGs for leak detection also are required to keep detailed inventory records. The ATG manufacturers have requested interpretation of this and have been told that facilities with ATGs that are not certified by the manufacturer as meeting the leak detection requirements of the regulations (see above) also are required to keep inventory control records. Facilities with ATGs that are certified to meet the federal performance requirements are exempt from the inventory recordkeeping requirements.

Maine proposed regulations would exempt inventory and Statistical Inventory Analysis requirements only if the ATG is able to detect a leak of 0.1 gph with a probability of detection of 95% and a probability of false alarm of 0.5%.

The Future of ATGs

ATGs are continuing to evolve. Already there are models where the tank probes are directly connected into personal computers, eliminating the need for an expensive console to process the probe data and communicate results. Accompanying software allows any computer to

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function exactly like an ATG, with vastly improved capabilities for graphical display of information, report generation, and printing.

There also are greatly simplified consoles being developed that will do little more than serve as a communications interface. A remote computer will call up this communications box, download inventory information, and produce management reports for all of a marketer's facilities automatically. USTS, which a decade ago were still in the age of wooden sticks and Model T Fords, are now able to cruise the information superhighway.

What I believe is the most exciting development in the ATG field is the hybridization of ATG's and SIR. ATGs that work with only tank information have several limitations:

⇒ They cannot conduct product inventory (sales information is lacking);

⇒ They make conducting a CSLD type of test a much more complicated procedure than it might seem at first glance.

By allowing an ATG to access sales information directly through the dispensing meter, however, all of these problems can be addressed.

⇒ Inventory can be kept without any intervention from unreliable humans. Therefore, it becomes possible to conduct very accurate SIR and inventory management that up until now has only been wishful thinking.

⇒ SIR has the advantage of including piping leak detection at no extra cost.

Having the SIR software in the ATG box also allows leak detection to occur in essentially real time. This means that small leaks could probably be identified in a matter of hours, and the SIR /ATG combination should even be able to function as a pressurized piping line leak detector (i.e., find 3 gph piping leaks in one hour), thus meeting ALL of a storage system's leak detection requirements in one fell swoop.

Of course, this rosy picture is highly dependent on the accuracy and consistency of the meters that dispense product and requires an unshakable faith in the ability of statistics to successfully tease out a kernel of truth from a tangle of data.

P.S.

ATGs in their many forms can ensure environmental protection and profitability of petroleum product storage and marketing facilities. But as with any tool, ATGs must be understood in order to be used effectively. Manufacturers can increase customer satisfaction by making their ATGs easy to install, program, and use. Owners can get their money's worth only if they read and understand the operating instructions for their ATGS. Keep in mind that the story at the beginning of this article is true. Don't let it happen to you.

Principle Article Excerpted from LUSTLine Bulletin 24, July 1996, Published by the New England Interstate Water Pollution Control Commission and written by Marcel Moreau, former Maine DEP employee and nationally recognized petroleum storage specialist. Slightly modified for use in Maine by the editor

If you have any questions of a technical or regulatory nature that you wish to have answered in this newsletter, or any ideas for future educational seminars, please direct them to Jim Hynson, Board of Underground Storage Tank Installers, c/o Maine Department of Environmental Protection, State House Station 17, Augusta, ME 04333. Or call 207/287-2651. Or e mail to Jim.R. Hynson@state.me.us.

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replaced by NACE RP-02-95, "Corrosion Control of Underground Storage Tank Systems by Cathodic Protection;" STI R 892-89, "Specification for STI-P_3 System of External Corrosion Protection of Underground Storage Tanks" was replaced by STI-R-892-91 (same title); PEI RP/100-90, "Recommended Practices for Installation of Underground Liquid Storage Systems," was replaced by PEI RP/100-94 (same title), 1987 editions of NFPA 30 ("Flammable and Combustible Liquids Code") and 30A ("Automotive and Marine Service Station Code") were replaced with 1996 versions, and the 1987 edition of API 1604, "Recommended Practice for Abandonment or Removal of Used Underground Service Station Tanks," was replaced with the 1996 edition.

- The leak detection standard for interstitial space monitoring will be simplified to a clear-cut 150 gallons a month. The old regulations allowed either 150 gallons per month or 0.2 gallons per hour.
- Vent float valves are to be prohibited for use as overfill protection on suction piping systems.
- Cathodic protection and secondary containment will now be required for offset fills.
- A provision is added to allow DEP approved leak detection systems, other than secondary containment and continuous interstitial space monitoring, to also substitute for statistical inventory analyses provided those leak detection systems are able to detect leaks of 0.1 gph with a 95% probability of detection and a 5% probability of false alarm.
- New automatic tank gauges (ATG's) would have to meet performance standard of being able to detect a leak of 0.1 gph. Existing ATG's which meet 0.2 gph standard remain allowed, but cannot be used to exempt facilities from statistical inventory analysis requirements.
- The deadline to retrofit overfill and spill prevention equipment would be extended to Dec. 22, 1998, when all Federal requirements would also become applicable.
- Spill buckets will have to be maintained such that 3 gallons of overfill capacity is maintained.
- The nature of the information to be kept when testing leak detection systems is specified in the proposed amendments.
- Specific operation and maintenance requirements for ATG's would become rule. Specifically, ATG's would have to (1) be installed as permanent components of tanks systems, (2) ATG tests would have to be conducted at 60% or more of tank capacity, (3) there would have to be daily monitoring that could detect water level gains of more than 1/2 inch, and (4) the ATG systems would have to have back up power sufficient to preserve test data in case of a power outage.
- On heating oil tanks, copper piping would have to be electrically isolated from the tanks.
- The new regulations would clarify secondary containment for waste oil tanks, in that all parts of the facility "routinely containing product" would have to be secondarily contained.
- DEP could allow a facility to remain "temporarily out of service" indefinitely, provided the owner/ operator obtains DEP approval and (1) the owner can document the facility is not leaking, (2) proper (e. g. according to chapter 691) preparation of the facility to be temporarily out of service has occurred, (3) the facility passes a precision test prior to its being returned to service, and (4) the facility meets regulations for corrosion protection.
- The regulations would further

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Tank Removal Notices - Once May Not Be Enough.

Review of DEP records earlier this year indicated we had over 700 unconfirmed removal notices that were more than six months old. In late February we sent out a letter to the owners of these tanks to determine if these tanks had actually been removed. The status of these tanks was changed to "Active" if the DEP did not recieve written confirmation of removal.

From now on if the DEP does not receive written confirmation that a tank has been removed within 6 months of receiving a removal notice the tank status will be changed from "Planned for Removal"to "Active". A postcard is attached to each removal notice form to send in to confirm tank removal.

This means that if a tank removal notice was sent in last March and the removal has been delayed until this October a second Notice must be sent to the DEP. If we do not receive written confirmation of removal within 6 months of receiving the removal notice then the Notice will be considered out -of-date. A second Notice must be submitted before the tank can be removed. As always this Notice must be received at least 30 days before the tank is removed.

Thank you in advance from DEP's Oil Enforcement staff.

API's New RP 1604, "Closure of Underground Petroleum Storage Tanks," Replaces 1987 Edition

If you remove or dispose of underground petroleum storage tanks, you should have a copy of the American Petroleum Institute's (API's) nine-page recommended practice entitled *Closure of Underground Petroleum Storage Tanks* (API RP 1604, third edition, 1996). As the title implies, the document provides procedures for the closure in place, removal, storage, and the off-site disposal or sale of used underground tanks that have contained flammable or combustible liquids. Although the recommended practice specifically addresses UST systems at service station facilities, the principles outlined in API 1604 can be applied to similar systems used at other petroleum storage facilities.

U.S. EPA's Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tank Systems (40 CFR Parts 280 and 281) provide that API 1604 can be used as a guide to comply with the agency's requirements governing tank cleaning and closure procedures (40 CFR 280.71). As far as API is concerned, this edition supersedes the second (1987) edition for API 1604 (known then as *Removal and Disposal of Used Underground Petroleum Storage Tanks)* referred to in EPA's Standards. API states in the foreword to Closure of Underground Petroleum Storage Tanks that "according to EPA, an owner or operator conforms with this provision (40 CFR 280.71) of the Standards if it used the 1987 edition, which was in force when the Standards became final. However, an owner or operator who uses this amended version will also be meeting the requirement of the 1987 edition, and EPA encourages the use of the most recent version."

I also encourage you to use the third edition of API 1604. To begin with, this edition is much more user-friendly than the 1987 version. In addition, it incorporates most of the provisions included in the six page supplement to API 1604 (1987), published by the American Petroleum Institute in 1989. Users of the 1996 edition can find all the material they need in one spot and not have to constantly flip from the old 1987 version to the 1989 supplement to make sure they haven't missed anything.

When you carefully compare the 1987 edition (as revised by the 1989 supplement) with the 1996 edition, you will notice that just about every section includes some changes in API's recommended procedures. Some changes are simply editorial in nature. Others, however, may change the way you handle tank closure, removal, storage, and off-site disposal. Here are a few of the differences we noticed when we compared the two documents:

- The old version (1.3.2.2) states that "a combustible gas indicator (CGI) should be used to check for hazardous vapor concentrations." The 1996 recommended practice (1.3.2.2)

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emphasize that both tanks and piping must be removed in the case of an underground tank removal.

- Requirements for having an installer at a gasoline tank removal would be clarified to indicate that an installer would be needed if the tank had been used for gasoline storage within the previous 12 months.
- Underfill methods of volumetric tank testing would be permitted provided it is conducted with the tanks at least 60% full and such practice meets with manufacturer's and EPA test protocols.
- Specific information would be required for all volumetric tank test results submitted to DEP. That information would include facility name, address, registration and tank number, product stored, test results, the method's threshold for declaring a leak, location of ground water in relation to the product level of the tank, and a certification the test method meets manufacturer's test protocols.
- Piping line tests would have to meet manufacturer's and EPA test protocols, and the information submitted to DEP would have to be similar to that submitted for tank tests.
- Alternatives to preinstallation air testing of tanks and piping could be used, provided they are recommended and described in the appropriate tank or piping manufacturer's installation guidance.
- Anti-siphon valves would be required for underground piping associated with above ground tanks.
- Purging/inerting options would be expanded for both tank removal and abandonment in place. Specifically, nitrogen and air purging would be allowed. Air purging could only be done if exhaust is monitored for explosive vapors and vacuum trucks are not used as air movers.
- The "overrich" option for tank removal is clarified such that a tank is over-rich if a specific reading of 15% or more product vapor or less than 6% oxygen is obtained. In all cases of tank removal, on-site sources of ignition must be controlled.

API 1604 (continued)

(Continued from page 8)

says: "A combustible gas indicator (CGI) should be used to check for hazardous vapor concentrations in and around the work area." Another section (4.3.1) of the 1996 recommended practice now requires CGI readings immediately before initiating work in the tank area or to the tank.

- The 1987 version of API 1604 (2.2d) required the contractor to "disconnect electric power to the pumps" when securing a tank to be temporarily out of service. The 1996 edition (2.2d) provides an alternative: "Disconnect or lock-out the electric power to the pumps."
- The revised API 1604 contains a new section (3.3) on site evaluation prior to permanent closure or change of service.
- Sections 4.2.2 and 4.2.3 of the 1996 edition permit small, specific quantities of water to be used to flush the piping and rinse the tank.
- Section 4.3.4 of the revised (1996) version now permits the contractor to use crushed dry ice or shaved dry ice to render a tank inert.
- API has changed its procedure for testing the tank atmosphere and excavation area for flammable and combustible vapor concentrations. The 1987 recommended practice (4.3.2) required that readings of 20 percent of the lower flammable limit be obtained before the tank could be considered safe for removal from the ground. The 1996 edition requires that readings of 10 percent of the lower explosive limit be obtained before the tank is considered safe for removal (4.4.2).
- Section 4.4.6 of the 1987 edition required that tanks be removed from the site as promptly as possible after vapor-freeing procedures were completed. Section 4.6.6 of the 1996 edition permits the tanks to be either cut up, crushed or removed from the site.
- The 1996 version contains a section (6.1.1) which requires tanks, before they are reused, to be recertified by the original manufacturer prior to reuse. This language is stronger than in the previous edition.
- Section 7.2.1 of the revised API 1604 adds a sentence to the old 7.2.1 that admonishes contractors to "use explosion-proof, non-sparking tools" when disposing of a tank.

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Board Bio: Joseph B. Probert

Bruce, whose formal handle is Joseph Bruce Probert, says he was born a long time ago. That must be true, since his baby picture is drawn on the wall of a cave in the Berkshires. Actually, he was born in Needham, Mass. and raised in Westwood, Mass. He's been a member of the Board of Underground Storage Tank Installers (BUSTI) since April 6, 1993, when he replaced Leslie Smith as the Board's representative of the Maine Chamber of Commerce.

Bruce came to Maine at the age of 17. He subsequently received two degrees from the University of Maine at Orono in 1960; Forestry, and Pulp and Paper Technology. From the University he went to Great Northern Paper where he worked as a research engineer and then to the military where he spent two years as an officer in the Intelligence Corps. In 1963, he moved to Sprague Energy in Searsport as a stevedore and worked his way up to now be the Maine Division Manager. I had to look this up myself in the American Heritage Dictionary, but a stevedore is "a person employed in the loading or unloading of ships." I'd thought it was the guy who helped the matador in a bullfight, but then I didn't know about any bullfights in Searsport.

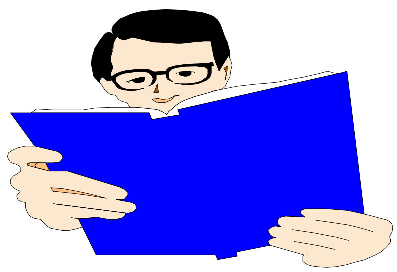
He and Joan, his wife of 36 years, have resided in Searsport for 30 of the past 33 years. Joan is the local branch manager of People's Heritage Bank. They have a married daughter, Chris, who lives in Cape Neddick, ME as well as a son, Brian, who lives in Plymouth, ME with his wife.

Bruce serves as a director of the Searsport Lions Club and long time (20 years) chairman of the local planning board. His leisure time activities include harvesting wood products on his certified tree farm, gardening, cross country skiing, hunting, and especially fishing.

New Fire Codes to Be Available

In May, the National Fire Protection Association (NFPA) adopted changes which will result in new, 1996 editions of its codes that deal with the storage of flammable and combustible liquids. Specifically, NFPA Code 30, Flammable and Combustible Liquids Code; Code 30A, Automotive and Marine Service Station Code; and NFPA 395, Standard for the Storage of Flammable and Combustible Liquids on Farms and Isolated Construction Projects; are involved with the changes. More information on the availability of these updated versions can be obtained from NFPA at 1/800/344-3555. For all the cyberspace travelers, the e mail is Library@nfpa.org and the web site is http://www.wpi.edu/fpe/nfpa.html. These codes are incorporated by reference into Maine's underground tank regulations and are included in the Class 2 underground tank installer final exam and the underground gasoline tank remover written exam.

Many organizational changes have been made, and considerable changes to technical requirements for above ground storage tanks (AST's) have been incorporated into the newer versions. Perhaps the most important changes for installers and removers, though, is that the standards for underground tank removal have been made more specific and closely pattern those of API 1604.



BUSTI In Cyberspace

For anyone whose lost the copy we sent you many long years ago, you can now get the BUSTI rules, along with the current, effective version of DEP's Chapter 691, off the Internet. From the State of Maine home page (http:// www.state.me.us), select "State Agencies," then select "Department of Environmental Protection." An alternative is to go directly to DEP's home page at “http://www.state.me.us/ dep/ mdephome.htm. “ Once at the DEP home page, select "Maine DEP Rules and Regulations" under "Regulatory Information." There you will find a list of all the DEP and BUSTI rules which you can download to your own computer. All DEP and BUSTI rules are currently in Microsoft Word for Windows version 2.0 format.

You can also reach BUSTI staff via e mail at Jim.R.Hynson@state.me.us.

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